REMARKS:

The amendments to claims 1 and 35 are supported by the specification and by the drawings, specifically being shown by Figs. 1 and 3 and replacement Fig. 2. No new matter has been added. The structure of new claim 53 is shown in Fig. 4.

CLAIM 1:

Claim 1 distinguishes the present invention over the combination of cited prior art wherein at least the following two limitations are neither taught nor suggested by the prior art:

> (1) a contacting electrode washing station disposed adjacent to a contacting electrode (6, 14) from which said contacting electrode (6, 14) is washed or sprayed , and
>
> (2) a cell wall (10) exposed at the exit of an electrolysis region having an opening for the conveying path and a pair of sealing members (9, 23) each being attached to the cell wall (10) to extend into the opening one form below and one from above the opening and to be in contact with the conveying path so that they seal the conveying path opening and wipe off any liquid from the work pieces passing by.

In the prior art, Hirt (US 4,282,073) and Avellone (US 4,401,523) teach washing stations, but these washing stations are for washing the strip in a "*bath* " between processing steps. Neither Hirt nor Avellone is concerned with cleaning their electrodes.

To the contrary, applicants are concerned with washing or spraying each contacting electrode to inhibit any electrolytic action outside of an electrolysis region (a module M). Applicants do not employ a bath but a dedicated sprayer which is positioned immediately adjacent the contacting electrode it is to spray.

In the prior art, Hartmann (US 5,425,862) and Geissler (US 6,238,529) each employ a sealing member. For Hartmann it is the sealing rollers (20) (22). For Geissler it is the sealing rollers (17). Geissler utilizes a wiper/wear blade (unnumbered) attached to the sealing wall (17) to contact the sealing roller (18), which sealing roller (18) is in contact with the conveying path. Both Hartmann and Geissler are susceptible to leakage or seepage at

the point where a sealing roller contacts a wall, i.e., rolls against a wall. Or with the Geissler sealing roller, the roller contacts, i.e., rolls against, a wall extension.

To the contrary, applicants use sealing members attached to the wall and in wiping contact with the conveying path. Any leakage or seepage at the contact point with the wall, susceptible with the prior art, is thereby eliminated with the present invention as applicants' sealing member is fixed, i.e., sealingly attached to the wall.

CLAIM 35:

Claim 35 distinguishes the present invention over the cited combination of prior art with at least the following two limitations:

> (1) at least one layer of isolation material (13) extending between a respective counter electrode (4) and the conveying path of the work pieces (1), said isolation material (13) extending the entire length of said respective counter electrode (4) so as to cover the entire face thereof facing the conveying path of the work pieces (1), and
>
> (2) a cell wall (10) exposed at the exit of an electrolysis region having an opening for the conveying path and a pair of sealing members (9, 23) each being attached to the cell wall (10) to extend into the opening one from below and one from above the opening and to be in contact with the conveying path so that they seal the conveying path opening and wipe off any liquid from the work pieces passing by.

In the prior art, Hartmann shows a tampon member (66) (67) which is positioned at the exact mid-length (48)(53) point of his electrolysis chamber. This tampon does act as an isolation material. However, its purpose is not to isolate, but to physically support the middle of the extension of the conveyed film (1) through the region between the entrance rollers (20)(21) and exit rollers (22)(23). This mid-length support is necessary to keep the Hartmann film from buckling or sagging as it passes through the chamber (6). Therefore, Hartmann sizes his tampon (66) (67) to extend only a short distance before and after the mid-point of his chamber.

In contrast, applicants' isolation material covers the entire length of their anode electrodes (4) and indeed the entire surface of these anode electrodes. The primary purpose of this structure as recited in the claim language is "isolation". Applicants' isolation material is not a mid-point mechanical support mechanism as shown by Hartmann.

As partially recited above, with respect to claim 1, Hartmann and Geissler each employ a sealing member. Hartmann's sealing member is the sealing rollers (20) (22). Geissler's sealing member is the sealing rollers (17). The Geissler wiper blade (unnumbered) which is attached to the sealing wall (17), is a wall extension, and contacted by the turning sealing roller (18). It is the Geissler sealing roller (17) which contacts the conveying path. Thus, neither the Hartmann sealing rollers nor the Geissler sealing rollers are attached to the wall. In fact, neither reference's sealing rollers can be attached to their respective walls because, then they would not be able to roll, i.e., turn. Both Hartmann and Geissler are susceptible to leakage or seepage at the point where a sealing roller contacts the wall, or wall extension, in a rolling manner.

In contrast, applicants use sealing members attached, i.e., physically fixed, to the wall while also being in wiping contact with the conveying path. A positive seal is created where the sealing member is fixed. Therefore, any leakage or seepage at the contact point of a moving roller with the wall to which the prior art is susceptible, is precluded with the structure of the present invention.

CONCLUSION:

There are at least two requirements to be met with the present invention as claimed, which are not available with the prior art, these being:

1. The device must be suitable to treat the small structures on the surface of the work pieces, which implies that the distance between two contacting electrodes which pertain to one electrolysis region is limited by the size of these structures. As this size is small, this distance is also small, and hence there must be many electrolysis regions in sequence to achieve the required metal plating in all the electrolysis regions of the device as the work piece travels through them one after another. As the cost of the device will increase as the overall number of electrolysis regions increases, the length of each electrolysis region must be as large as possible to have as few electrolysis regions as possible in the device.

2. However, this last requirement is contradictory to the further requirement that plating liquid must not reach the contacting electrode as the work piece exits the electrolysis region. This further requirement is necessary to ensure that the contacting electrode of each electrolysis region does not plate with metal. Otherwise, the lifetime (life expectancy) of the whole device would be shortened.

In order to achieve the above two requirements simultaneously, contacting electrodes are provided on either side of the electrolysis region, and a combination of measures is realized, namely, providing a contacting electrode washing station, and a pair of sealing members one from below and one from above the conveying plane and touching contact with the conveying plane.

By realizing with the present invention, that the contacting electrodes are provided on either side of the electrolysis region, a length of the electrolysis region being as long as possible is realized so that cost of the device is minimized. Moreover, by realizing that a combination of features is used to prevent plating liquid from leaking from the electrolysis cells and coming into contact with the contacting electrodes on the outside at the exit of the respective electrolysis regions, a long lifetime (longer life expectancy) of the whole device is achieved.

Among the improvements provided by the present invention are: an improved sealing at the entrance and exit of each electrolysis region; an improved isolation of the anodes/counter electrodes; and a washing of external counter electrodes by dedicated facilities to reduce or eliminate all electro-chemical activity between electrolysis regions. Thus, an improved system is provided with the present invention, wherein more exact control of the electrolysis process at each region is possible, an optimization of the sizing of each electrolysis region and an optimization of the spacing between electrolysis regions is achieved, and a longer working life of the device is yielded.

The application should now be considered to be in condition for allowance. It is requested that it now be sent to issue.

No additional fees are believed to be required. In the event that an additional fee is required with respect to this communication, the Commissioner is hereby authorized to charge any additional fees, or credit any overpayment, to Paul & Paul Deposit Account No. 16-0750. (order no. 8111)

Respectfully submitted,
Paul & Paul

/john j. simkanich, regis. no. 26036/

Date: May 21, 2010

by: John J. Simkanich
Regis. No. 26,036
2000 Market Street, Suite 2900
Philadelphia, PA 19103
(215) 568-4900

FAX 215-567-5057

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by: John J. Simkanich

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